BLACK-FOOTED FERRET

Surveys on Seven Coal Occurrence Areas in Southwestern and Southcentral Wyoming

June 8 - September 25, 1978

BLACK-FOOTED FERRET SURVEYS ON SEVEN COAL OCCURRENCE AREAS IN SOUTHWESTERN AND SOUTHCENTRAL WYOMING JUNE 8 TO SEPTEMBER 25, 1978

Final Report

by

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TABLE OF CONTENTS

BLACK-FOOTED FERRET SURVEYS IN SOUTHWESTERN AND SOUTHCENTRAL WYOMING

INTRODUCTION

This report summarized results of black-footed ferret surveys conducted on seven Bureau of Land Managment (BLM)-administered coal lease sites in Wyoming, June-September 1978 (Fig. 1). The lease sites contain colonies of white-tailed prairie dogs, potential habitat for the black-footed ferret, an endangered species.

Section 7 of the 1973 Endangered Species Act requires that these areas be investigated for the presence of black-footed ferrets before final Environmental Statements are prepared and coal lease permits issued. The Denver Wildlife Research Center, Section of Wildlife Ecology on Public Lands, U.S. Fish and Wildlife Service, conducted the surveys for black-footed ferrets under BLM contract (FWS-14-16-0009-78-929).

Objectives of this study were (1) to search for black-footed ferrets or their sign by accepted methodology (Henderson et al. 1969), and (2) to test new or alternative methods for detection of black-footed ferrets, as time allowed.

STUDY AREA

Surveys were conducted in southern Wyoming, part of an area described by Kuchler (1964) as the Great Basin Sagebrush Zone. The region can generally be described as an elevated plateau with a flat, treeless land surface, broken by high hills, rolling terrain and isolated mountains.

Southern Wyoming is characterized by low summer moisture and low snowfall. Though moderately fertile, lands are used mostly for livestock grazing. In areas of available water, irrigation provides suitable sites for intensive agriculture.

Underlying these lands are vast deposits of coal, a resource currently subject to intensive and extensive development. Since much land is administered by the BLM, most soil disturbance resulting from removal of coal will be on public domain.

Descriptions of coal lease sites surveyed, their locations, and physiography are appended. (Appendix I).

METHODS

Traditional search methods developed by Henderson et al. 1969 in South Dakota for detecting black-footed ferrets in black-tailed prairie dog (cynomys ludovicianus) towns were used. These methods included searching while walking through prairie dog towns for black-footed ferrets or their signs (scats, bones, trenches, and covered prairie dog burrows). Daytime observations of prairie dog behavior were made and at night, spotlighting was used to look for black-footed ferrets. Two alternate search methods, spotlighting from a car along established routes, and daytime searches from horseback, were evaluated.

Prior to starting surveys, a team training session was conducted to familiarize team members with known black-footed ferret signs. Color slides were shown by Conrad Hillman, Patuxent Wildlife Research Center, who also led a field trip to provide on-the-ground experience in a white-tailed prairie dog colony.

Searches were conducted in white-tailed prairie dog towns initially mapped and marked on topographic maps by the BLM. Searches were conducted as prioritized by the Wyoming State Office of the BLM and began June 8, 1978. Medicine Bow Bypass was the first lease surveyed followed by Black Butte, South Haystack, Carbon Basin, Hanna South, Seminoe I and Red Rim. Attempts were made to search each lease site for unmapped colonies. Final field maps were prepared for each lease with all known colonies delineated. Incorrectly mapped colonies were identified. Acreage was determined for each prairie dog colony using a standard dot grid (100 dots/sq. inch).

Three camp trailers were used to house survey team members stationed in Rawlins, Wyoming or camped on lease sites.

Daytime Surveys

Searches consisted of delineating each prairie dog town boundary, locating and examining each prairie dog burrow, and determining if ferret sign was present. Stratification of colonies and random sampling were considered, but abandoned in favor of total searches.

Daytime surveying required locating the town or colony, estimating the number of personnel needed to conduct the survey, and determining how the survey could be most efficiently done. Searches were accomplished by lining up 2-7 survey team members spaced 50 to 100 feet apart, and systematically walking each colony (Fig. 2). Surveyor's flagging was used to mark the outer boundary of each pass, since several passes were often necessary to complete a survey without missing burrows. These surveys were conducted in early morning, a period when ferrets are most active (Hillman 1968), and before fresh diggings from the previous night dried out.

Survey personnel were provided with "tallywhackers" to tabulate burrows, and binoculars to scan colonies for ferrets and view prairie dogs. All burrows two inches or more in diameter were examined. Data collected for each town were recorded on field forms, and included legal location, date, total hours searched, meteorological data, number of burrows, presence or absence of ferret signs, physiographic features and general vegetational type.

Nighttime Surveys

Nighttime surveys included late evening and early morning spotlighting in prairie dog towns. Most of these surveys were conducted one to three hours before sunrise, although some surveys were conducted before midnight. Nighttime efforts depended on numbers and densities of prairie dogs, town location, and the presence or absence of signs. Colonies with high hole densities and those where possible ferret signs was found were selected for night survey. Some colonies were not spotlighted because they were inaccessible to vehicles.

Spotlighting was conducted from motor vehicles with hand held spotlights fitted with aircraft landing lights of 100,000 candle-power. Colonies were located in daylight and marked with flagging to facilitate relocation after dark. Daytime surveys also helped in locating high burrow concentrations, access roads, and elevated locations from which to spotlight. Spotlighting was accomplished in the following manner.

Two observers parked the vehicle, waited five minutes, then spotlighted slowly back and forth on alternate sides of the vehicle. Green eyeshine or animal movement were sought. The spotlight was used in five-minute intervals usually for a minimum of one hour per stop. Data were recorded on field forms and included time spent and any wildlife observed.

As sunrise approached, the effectiveness of the light beam was decreased, and binoculars and window-mounted spotting scopes were used to scan colonies. Scanning also allowed us to record prairie dog activities such as emergence from burrows.

Alternate Survey Methods

Daytime survey on horseback was used to search a large sagebrush covered drainage. Two riders surveyed the area for prairie dog colonies and counted burrows, and this method was evaluated. Nighttime surveys along predetermined automobile survey routes, each with five to seven stopping points, were also evaluated. Routes were driven during daytime and stopping points located and flagged. At sunset, observations were begun. Spotlighting was started at dark and continued until sunrise. White-tailed prairie dog colonies at each stop were searched with spotlights for one hour.

RESULTS

From early June through September, 1,435 person-hours of walking, spotlighting and horseback surveys were conducted on over 110,000 acres of coal lease lands. Actual lease site acreage differed from those provided by the BLM personnel because private inholding acreages have been excluded.

Colonies

On the lease sites 164 white-tailed prairie dog colonies covering nearly 10,000 acres were found (Table 1). Individual colonies are shown on Maps 1-7 in Appendix I. Medicine Bow Bypass, the first lease surveyed, was not mapped accurately enough to determine acreages. Complete topographic maps were not available for the Red Rim lease and boundaries of white-tailed prairie dog colonies were difficult to map on orthophotographic maps provided. Acreages given for colonies on this site are best estimates.

White-tailed prairie dog colony size ranged from two acres on Black Butte to 1,261 acres on South Haystack. Average colony acreage was highest on South Haystack at 183 acres per colony, and lowest on Black Butte at 39 acres per colony. Accurate estimates of colony acreages depend upon accurate mapping. White-tailed prairie dog colonies are not as well defined as those of black-tailed prairie dogs and are often so scattered that determination of colony boundaries is difficult.

Aerial photography can be useful to help locate and map prairie dog colonies. Maps provided for Black Butte were developed from aerial photography. Of 115 colonies mapped from the ground, only 24 have been incorrectly interpreted on the aerial photos. Common errors in photo interpretation included inclusion of areas with ground squirrel and/or badger diggings, rabbit forms, ant mounds, and rock outcrops as prairie dog colonies. Ground survey crews located colonies not previously mapped on the Black Butte lease site.

Maps for the southcentral leases were not developed from aerial photographs and indicated only major prairie dog concentrations. These were not as useful as maps based upon aerial photographs. The Carbon Basin map showed six concentrations of prairie dogs. Our survey efforts revealed 32 colonies. Seminoe I map showed 3 concentrations, but in 12 person-hours searching for colonies, we failed to locate any. All southcentral leases required proportionately more time to survey per town than Black Butte, since individual colonies had to be located.

Colonies of white-tailed prairie dogs were found on all aspects, at elevations ranging from 6,500 to 7,000 feet, and in a variety of locations from lowland flats to upland ridge tops. Colonies were most commonly found along drainages. In the Black Butte survey, 60 of 107 (56%) of the colonies were found along drainages.

No attempt was made during this survey to quantify vegetational types found on each lease site. Plant communities commonly included big sagebrush, rabbitbrush, horsebrush, greasewood, kochia, halogeton, saltbush, basin wild rye, squirreltail, arrowgrass, western wheatgrass, and bluebunch wheatgrass.

Burrow Counts

Over 105,000 prairie dog burrows were examined during this survey. Burrows were of different types. Excavated soil from some burrows formed mounds (Fig. 3), while other burrows were found in hillsides or were flush to the ground. Still other burrows were located at the bases of conical depressions, probably formed by repeated prairie dog movements (Fig. 4). Average number of burrows per colony on each lease ranged from 3 per acre on Hanna South to 16 per acre on South Haystack (Table 1). Black Butte had the greatest variation, from 1-101 burrows per acre. These figures are low when compared to results from other studies. Tileston and Lechleitner (1966) found 22 burrows per acre in Colorado, and Clark (1977) observed 23 burrows per acre in Wyoming.

Burrow counts in this survey included some non-prairie dog holes because all holes two inches or more in diameter were examined. Other burrowing animals observed during the survey included cottontail rabbit, Richardson's, thirteen-lined, and Uinta ground squirrels, and badger. Because of the difficulties in determining what animal excavated a hole, no effort was made to classify individual holes encountered. Fecal droppings can be used to help identify the burrowing animal, but in prairie dog colonies they are not positive because of cohabitation of burrows by more than one species. Richardson's ground squirrels, for example, were observed occupying a burrow simultaneously with a prairie dog. In some colonies, holes apparently abandoned by prairie dogs were occupied by ground squirrels. Abondoned holes may appear to be active prairie dog sites because of the ground squirrel activity.

Skeletal Remains

Skeletal remains of various animals were encountered. Identification was made only if the skull was present. Pronghorn antelope, coyote, badger, bobcat, short-tailed weasel, least chipmunk, white-tailed jackrabbit, cottontail rabbit, Richardson's ground squirrel and white-tailed prairie dogs were all found during the surveys. Tooth marks, possible indications of ferret kills, were not observed on any of the prairie dog skulls.

A single black-footed ferret skull (Fig. 5) was discovered while surveying a 147-acre prairie dog colony on the South Haystack site (Appendix I, Map 7, Colony A). It was found about 20 inches from the mouth of a burrow that appeared to have been recently cleaned by a white-tailed prairie dog. Soil around the mound was freshly turned and composed of small balls. When initially found, the skull was without canine teeth and only one half of the lower mandible was present. Careful examination and screening of excavated soil later revealed two canines, the other one half of the lower mandible, and several additional bones, including vertebrate and leg bones.

The skull was positively identified as that of a black-footed ferret by Dr. Robert Finley, U.S. National Fish and Wildlife Laboratory, Fort Collins, Colorado, and later confirmed by Dr. Don Wilson and Robert D. Fisher of the U.S. National Museum in Washington, D.C. (Appendix II).

Fecal Deposits

Fecal deposits or scats were often encountered during surveys. Scats from coyotes and badgers were found most often, but unidentified mustelid scats were also seen. Scats from black-footed ferrets are easily distinguished from those of badger and coyote but are very similar to those of mink and weasel (Murie 1954). On two lease sites, South Haystack and Black Butte, scats of weasel, mink, or ferret were found, but no positive identification could be made. Other investigators have found few known black-footed ferret scats above ground, and it's assumed that these animals generally defecate below ground (Hillman 1968).

On South Haystack, two questionable scats were found, and one of these was photographed (Fig. 6). This scat was found at the mouth of a burrow entrance approximately three miles north of the colony where the black-footed ferret skull was found (Appendix I, Map 7, Colony B). On Black Butte, a similar mustelid-type scat was found. This scat was located on an earth mound several feet from a burrow entrance on a 14-acre prairie dog town.

Trenches

Three lease sites, Carbon Basin, Black Butte, and South Haystack had unusual diggings or trench-like formations. On Carbon Basin, a trench was discovered during the training session before the survey. The survey conducted two months later on this site revealed no other potential ferret sign; the trench appeared to have been dug by a praire dog.

On Black Butte, one trench initially appeared to have been dug by a ferret, but careful examination indicated it was probably dug by a Richardson's ground squirrel. The burrow entrance contained apparent ground squirrel droppings and guard hairs. No black-footed ferret sign was found in the vicinity.

The South Haystack survey revealed several unusual diggings although no trenches were found. Two diggings were discovered about 75 yards apart on a 294-acre colony (Appendix I, Map 7, Colony C). The scat, previously mentioned, was located 1½ miles northwest of these diggings.

White-tailed Prairie Dog Behavior

Black-tailed prairie dogs exhibit specific behavior in response to the presence of a black-footed ferret in a dog town. One such behavior is plugging of burrows occupied or visited by ferrets. The occurrence of many plugged holes in a colony is considered an important indication of possible ferret presence (Hillman 1968). Plugging of burrows by black-tailed prairie dogs is not completely understood, and white-tailed prairie dogs may not behave in this way. Closed burrows encountered during our surveys were usually plugged below the surface, and the entrance to the burrow remained obvious. This plugging of holes differed from that observed in black-tailed prairie dog colonies in South Dakota, in that burrows there were totally covered, leaving no visible entrance. We observed one white-tailed prairie dog plugging its hole from the inside; black-tailed praire dogs plug holes from the outside.

Black-tailed prairie dogs often exhibit upright posture and alarm chatters in response to predators. This behavior was an indicator of black-footed ferrets in South Dakota (Henderson et al. 1969), and was also observed during two Wyoming surveys. In one instance, a mink was observed at midday in a white-tailed prairie dog colony on Black Butte. The animal was on an earth mound surrounded by eight to ten upright prairie dogs giving alarm calls. After the mink entered the burrow, no prairie dogs made an effort to plug it. On one other occasion, 12 to 15 prairie dogs were observed at Black Butte standing upright and chattering. Careful examination of the site with binoculars revealed a badger digging in a burrow. When approached, the badger disappeared; it probably would not have been observed had it not been for the upright positions and chattering of the prairie dogs.

Morning emergence times for white-tailed prairie dogs were determined during this survey. Earliest morning observations were recorded in July on Black Butte (Fig. 7). Prairie dogs were not seen before sunrise and usually emerged 30 to 40 minutes after.

Nighttime Surveys

Nighttime surveys revealed no black-footed ferrets. Jackrabbits and cottontails were the most frequent animals seen after dark, and one badger was observed. Small mammals, e.g., kangaroo rats and deer mice, were infrequently sighted on several lease sites. Problems encountered with nighttime surveys included sight selection and shadows. Areas with widely scattered burrows were difficult to observe because bushes and shadows screened many holes and interspaces.

Alternate Methods

Routes driven at night on which ferrets were sought with the aid of spotlights, provided good coverage of colonies with widely scattered holes, but long periods of observation at any one site were precluded.

We initiated the method at Black Butte when an unidentified mustelid scat was found. It was important to look at all colonies in the vicinity of the scat location, and the vehicular route allowed six different colonies within 1½ miles of the scat to be checked on the same night. No black-footed ferrets were observed.

Another alternative survey method employed the use of horses on Carbon Basin. Two riders on horseback surveyed 1,062 acres of white-tailed prairie dog colonies in big sagebrush vegetation. Riders, because of their elevated position, were better able to see the holes and traverse the tall vegetation. Surveys made by personnel on horseback were more efficient than those made on foot. Individuals on horseback surveyed 66 acres per person-hour, while those on foot averaged only 15.

Other Wildlife

Listings of 21 species of mammals, 45 of birds and 6 of reptiles and amphibians encountered during the survey are shown in Tables 2 and 3. Mammals included species indentified by visual observation, skeletal remains or signs. Birds and herpetofauna were recorded by visual observation only.

Badgers were the most common mammalian predator observed on white-tailed prairie dog colonies, and signs was found in nearly all colonies. On Black Butte, a badger emerged from a burrow with a prairie dog in its mouth.

Burrowing owls are considered rare in Wyoming (Wyoming Game and Fish Department 1977). These burrow-dwelling owls were observed on three lease sites including Black Butte, South Haystack and Red Rim. One burrow containing four young was found on Black Butte and a fifth owl was seen in another colony. Two observations of one and four owls each, were made on South Haystack, and one individual was seem at Red Rim.

SUMMARY

Surveys of seven coal lease sites for the black-footed ferret in Wyoming were begun in June and completed in September 1978. This effort comprised the most extensive survey ever conducted for black-footed ferrets in white-tailed prairie dog colonies. As originally assigned, a land area of 51,900 acres containing an estimated 94 prairie dog colonies was to be surveyed. When completed, team members had surveyed 110,240 acres, sampled 164 prairie dog colonies and spent 1,435 hours in white-tailed prairie dog towns.

The largest lease site surveyed was Black Butte, with over 39,000 acres containing 107 prairie dog colonies. The smallest lease site was Medicine Bow Bypass, 1,920 acres on which three prairie dog colonies were found.

Crew members surveyed over 105,000 burrows, most of which were dug by prairie dogs.

Possible ferret signs were present near eight of the observed burrows. Near four burrows, diggings of an unusual nature were observed, and at three, fecal material believed to be from mustelids was found.

The single most important sign of the black-footed ferret was a skull found on South Haystack. This skull is an important contribution to the knowledge of the occurrence of black-footed ferret in western Wyoming. The only previous record from Uinta County was a probable sighting near Fort Bridger in 1920 (Clark 1973). The skull documents the most western known occurrence of black-footed ferrets in the state and is the first positive record in Uinta County. It substantiates the presence of the black-footed ferret on South Haystack in the recent past, but does not prove ferrets presently occupy the site. An unidentified mustelid scat found on South Haystack indicates that a black-footed ferret may have been present there. Additional surveys and research are needed to document the animal's status on this site.

RECOMMENDATIONS

1. Map all white-tailed and black-tailed prairie dog colonies on lands administered by the BLM in Wyoming for future black-footed ferret surveys.

2. Black-footed ferret surveys should not be limited to lease sites. All colonies within one mile of a lease boundary should be surveyed because the ferret is mobile and searches of any one area are constrained by time.

3. Survey teams should have the flexibility to search non-lease lands. When requested, survey teams could be used for searches on public lands where recent sightings of black-footed ferrets have occurred.

4. Surveys should be continued on South Haystack and adjacent lands to determine whether black-footed ferrets exist in the area. Winter surveys from aircraft and snowmobile should be conducted to search for tracks, or signs of ferrets and to document any white-tailed prairie dog activities in winter, particularly on snow.

5. Studies to determine the chemical composition of known mustelid scats should be undertaken in an effort the develop analytical procedures for identifying black-footed ferret scats. Other research procedures such as scent posts, tracking stations, use of dogs, and European ferrets, should also be tested for use in white-tailed prairie dog towns. The reaction of white-tailed prairie dogs to European ferrets should be determined.

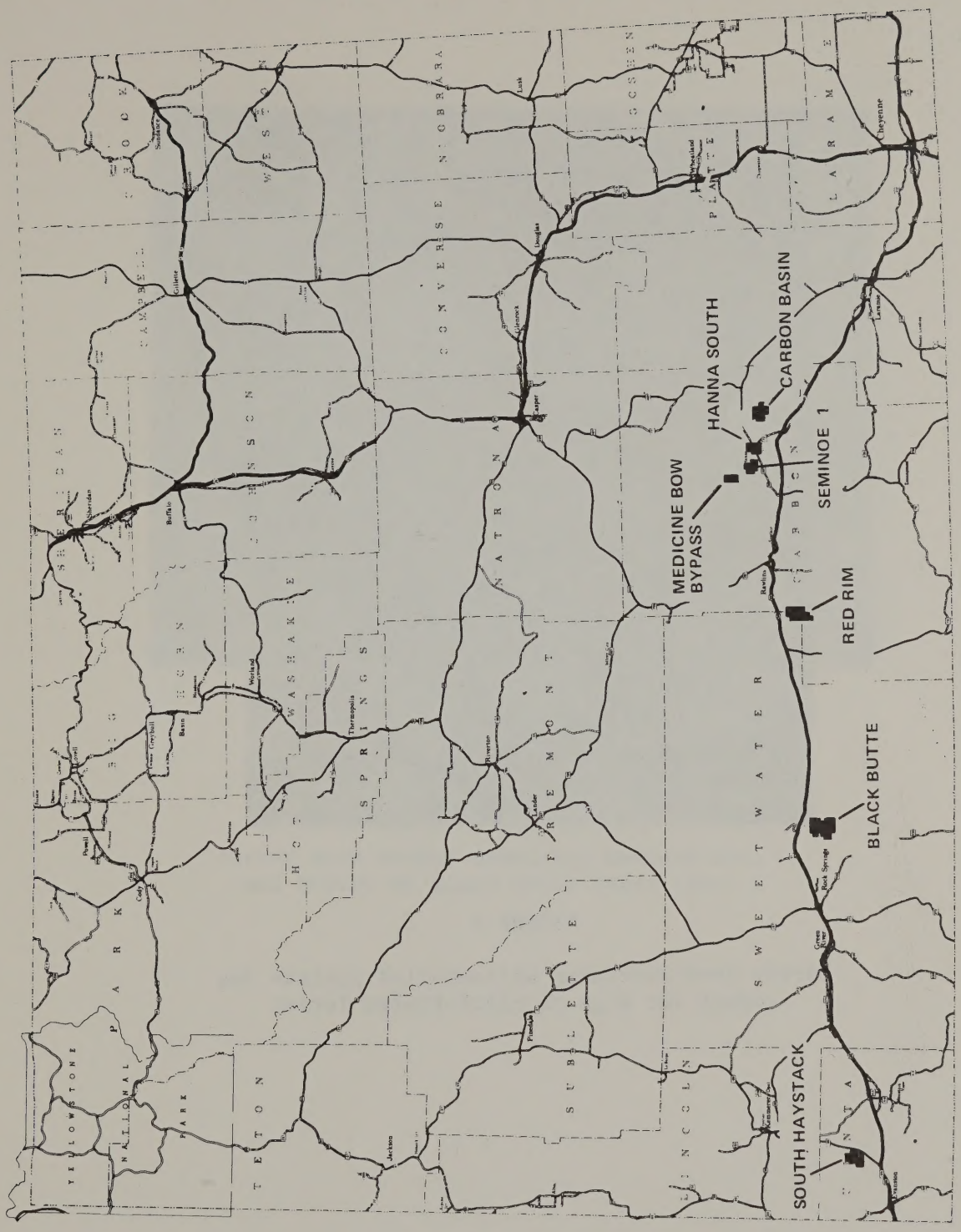


FIGURE 1

RELATIVE LOCATION OF SEVEN POTENTIAL COAL LEASE SITES IN SOUTHWESTERN AND SOUTHCENTRAL WYOMING

FIGURE 2

Survey crew searching white-tailed prairie dog colony for sign of black-footed ferret

FIGURE 3

Survey team member examining mounded soil
and burrow on Black Butte lease site

FIGURE 4

White-tailed prairie dog near a burrow entrance.
Note the absence of mounded soil.

FIGURE 5

Black-footed ferret skull from South Haystack

FIGURE 6

Possible black-footed ferret scat found
on South Haystack coal lease site

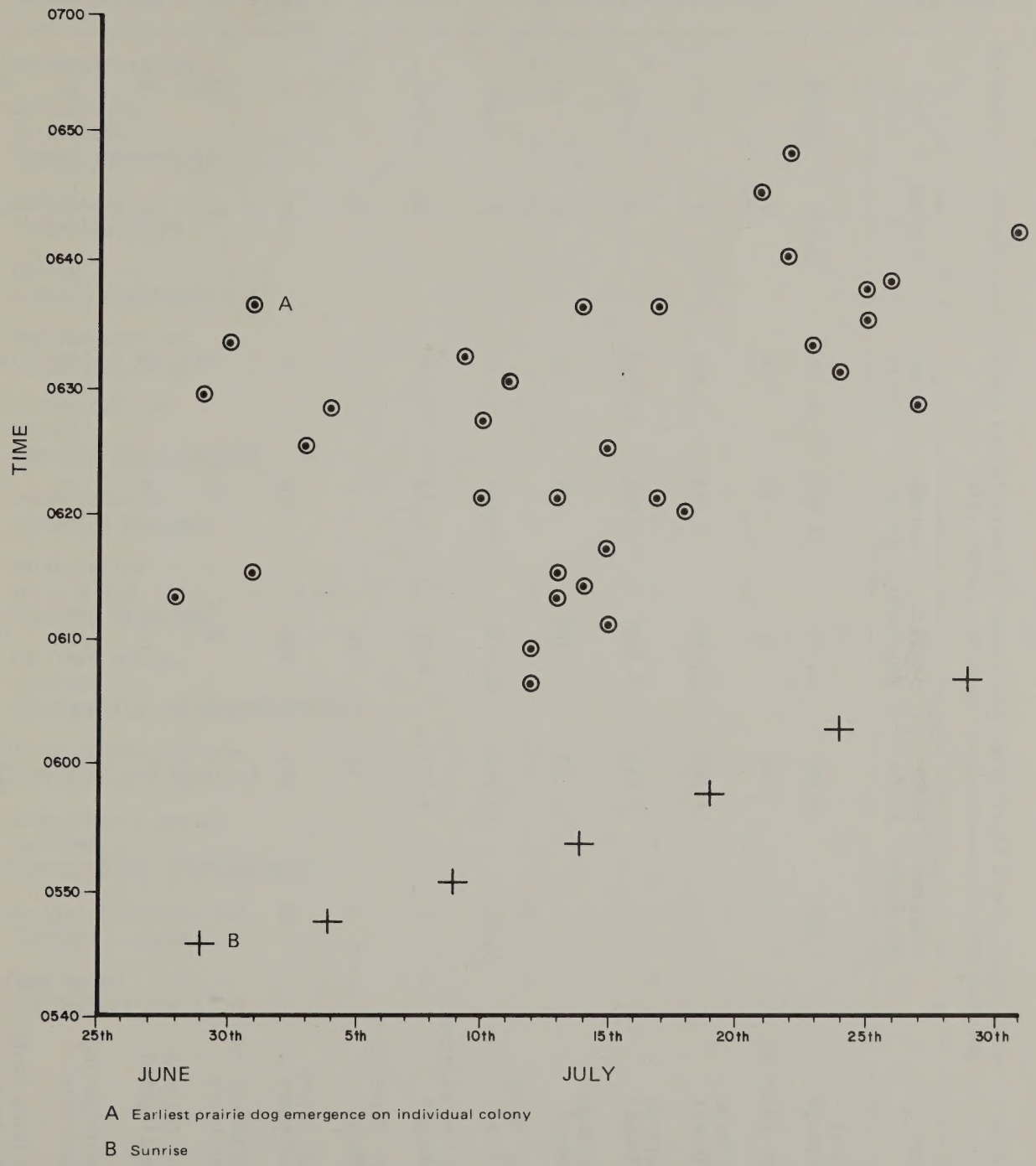


FIGURE 7

TIME OF EMERGENCE (MDT) OF WHITE–TAILED PRAIRIE DOGS ON BLACK BUTTE

Table 1. Coal Lease sites, their size, and number of white-tailed prairie dog colonies surveyed in southwestern and south-central Wyoming, summer 1978.

Area	Medicine Bow Bypass	Black Butte	South Haystack	Carbon Basin	Hanna South	Seminoe I	Red Rim	Total
Lease Acreage	1,920	39,040	8,320	14,400	4,320	3,840	38,400	110,240
No. Colonies	3	107	12	31	4	0	7	164
Acreage (Total)	-	4,153	2,190	2,743	390	0	423	9,899
Acreage (Range)	-	2-448	7-1261	3-558	63-157	0	6-125	
Acreage (Mean)	-	39	183	89	98	0	60	
No. Holes (Total)	1,702	47,723	35,410	16,662	1,130	0	2,870	105,497
No. Holes/acre (Range)	-	1-101	4-31	1-23	2-4	0	3-42	
No. Holes/acre (Mean)	-	12	16	6	3	0	7	
Day Survey Man-hours	48	407	186	116	37	12	34	840
Horseback Survey Man-hours	-	0	0	16	0	0	0	16
No. Colonies Spotlighted	-	27	12	6	0	0	4	49
Spotlighting Man-hours	-	145	142	71	0	0	37	395
Driving Route Man-hours	-	184	0	0	0	0	0	184

Table 2. Mammals encountered on coal lease sites.

Area	Medicine Bow Bypass	Black Butte	South Haystack	Carbon Basin	Hanna South	Seminoe I	Red Rim
Survey period 1978	6/8-6/9	6/13-8/9	8/10-8/30	8/27-9/11	9/8-9/9	9/10	9/12-9/25
Unidentified bat		1	1	1			
White-tailed jackrabbit (*Lepus townsendii*)	1	1	1	1	1	1	1
Cottontail (*Sylvilagus* spp.)	1	1	1	1	1	1	1
Beaver (*Castor canadensis*)							3
Ord Kangaroo rat (*Dipodomys ordii*)		1					
Yellow-bellied marmot (*Marmota flaviventris*)			1				
Least chipmunk (*Eutamias minimus*)		1	1	1	1		1
White-tailed prairie dog (*Cynomys leucurus*)	1	1	1	1	1		1
13-lined ground squirrel (*Spermophilus tridecemlineatus*)							1
Uinta ground squirrel (*Spermophilus armatus*)			1				
Richardson's ground squirrel (*Spermophilus richardsonii*)		1	1	1	1	1	1
Bushy-tailed wood rat (*Neotoma cinerea*)		1	3	3			
Deer mouse (*Peromyscus* spp.)		1	1	1			

Table 2. (Continued),

Area	Medicine Bow Bypass	Black Butte	South Haystack	Carbon Basin	Hanna South	Seminoe I	Red Rim
Survey period 1978	6/8-6/9	6/13-8/9	8/10-8/30	8/27-9/11	9/8-9/9	9/10	9/12-9/25
Muskrat (Ondatra zibethicus)		1					1
Bobcat (Lynx rufus)		2					
Coyote (Canis latrans)	3	1	2	3	3		1
Badger (Taxidea taxus)	3	1	1	1	3	3	3
Mink (Mustela vison)		1					
Black-footed ferret (Mustela nigripes)			2				
Short-tailed weasel (Mustela erminea)					2		
Long-tailed weasel (Mustela frenata)		1	1	1			
Pronghorn (Antilocapra americana)	1	1	1	1	1		1
Mule deer (Odocoileus hemionus)		1	1				1

1 Mammals observed

2 Skeleton found

3 Sign found (i.e., scat, digging, etc.)

Table 3. Birds and herpetofauna observed on coal lease site.

Area	Medicine Bow Bypass	Black Butte	South Haystack	Carbon Basin	Hanna South	Seminoe I	Red Rim
Survey period 1978	6/8-6/9	6/13-8/9	8/10-8/30	8/27-9/11	9/8-9/9	9/10	9/12-9/25
Canada goose (*Branta canadensis*)				X			
Mallard (*Anas platyrhynchos*)			X				
Wigeon (*Anas americana*)			X				
Gadwall (*Anas sterepera*)			X				
Shoveler (*Anas clypeata*)							X
Teal (*Anas* spp.)		X	X				X
Turkey vulture (*Cathartes aura*)		X	X	X			
Marsh hawk (*Circus cyaneus*)	X	X	X	X	X		X
Ferruginous hawk (*Buteo regalis*)	X	X	X	X			X
Red-tailed hawk (*Buteo jamaicensis*)			X	X			
Swainson's hawk (*Buteo swainsoni*)			X				
Golden eagle (*Aquila chrysaetos*)	X	X	X	X	X	X	X
Prairie falcon (*Falco mexicanus*)	X	X	X	X			X
American kestrel (*Falco sparverius*)		X	X	X			X

Table 3. (Continued).

Area	Medicine Bow Bypass	Black Butte	South Haystack	Carbon Basin	Hanna South	Seminoe I	Red Rim
Survey period 1978	6/8-6/9	6/13-8/9	8/10-8/30	8/27-9/11	9/8-9/9	9/10	9/12-9/25
Unidentified falcon (*Falcon* spp.)		X					
Sage grouse (*Centrocercus urophasianus*)		X	X	X		X	X
Great blue heron (*Ardea herodias*)			X				
Killdeer (*Charadrius vociferus*)		X	X	X	X		X
Upland Sandpiper (*Bartramia longicauda*)	X			X			
Unidentified gull		X					
Mourning dove (*Zenaida macroura*)		X	X	X			X
Great-horned owl (*Bubo virginianus*)		X	X	X			
Short-eared owl (*Asio flammeus*)							X
Burrowing owl (*Speotyto cunicularia*)		X	X				X
Unidentified owl			X				X
Common nighthawk (*Chordeiles minor*)		X	X	X			
Unidentified hummingbird		X					
Common flicker (*Colaptes auratus*)		X	X	X			X
Say's phoebe (*Sayornis saya*)		X	X	X			

Table 3. (Continued).

Area	Medicine Bow Bypass	Black Butte	South Haystack	Carbon Basin	Hanna South	Seminoe I	Red Rim
Survey period 1978	6/8-6/9	6/13-8/9	8/10-8/30	8/27-9/11	9/8-9/9	9/10	9/12-9/25
Horned lark (*Eremophila alpestris*)	X	X	X	X	X	X	X
Cliff swallow (*Petrochelidon pyrrhonota*)		X	X	X			
Tree swallow (*Iridoprocne bicolor*)		X	X	X			
Barn swallow (*Hirundo rustica*)		X					
Pinyon jay (*Gymnorhinus cyanocephalus*)		X					
Black-billed magpie (*Pica pica*)		X	X	X			X
Red-breasted nuthatch (*Sitta canadensis*)			X				
Rock wren (*Salpinctes obsoletus*)	X	X	X	X			X
Sage thrasher (*Oreoscoptes montanus*)	X	X	X	X	X	X	X
American robin (*Turdus migratorius*)		X	X	X			X
Mountain bluebird (*Sialia currucoides*)	X	X	X	X			X
Loggerhead shrike (*Lanius ludovicianus*)		X	X	X			X
Western meadowlark (*Sturnella neglecta*)	X	X	X	X	X	X	X
Sage sparrow (*Amphispiza belli*)		X					

Table 3. (Continued).

Area	Medicine Bow Bypass	Black Butte	South Haystack	Carbon Basin	Hanna South	Seminoe I	Red Rim
Survey period 1978	6/8-6/9	6/13-8/9	8/10-8/30	8/27-9/11	9/8-9/9	9/10	9/12-9/25
Brewer's sparrow (*Spizella breweri*)			X		X		
Chorus forg (*Pseudacris triseriata*)			X				
Sagebrush lizard (*Sceloporus graciosus*)		X	X	X			
Short-horned lizard (*Phrynosoma douglassi*)		X	X	X			X
Eastern yellow-bellied racer (*Coluber c. flaviventris*)		X	X				
Wandering garter snake (*Thamnophis vagrans*)			X				
Prairie rattlesnake (*Crotalus viridis*)	X			X			

APPENDIX I

Five of the seven leases, Medicine Bow Bypass, Seminoe I, Hanna South, Carbon Basin and Red Rim, are found in the BLM's southcentral district. Two leases, Black Butte and South Haystack occur within the southwest district.

Map 1. Medicine Bow Bypass is a 1,920-acre sagebrush-grassland located three miles east of Seminoe Reservoir and 15 miles north of Walcott, Carbon County, Wyoming. Terrain in this area is relatively level, varying from 6,480 to 6,610 feet in elevation.

Map 2. Seminoe I is a 3,840-acre big sagebrush covered lease site located one mile north of Highway 30, seven miles southwest of Hanna, Carbon County, Wyoming. This site has variable topography characterized by large level areas mixed with steep broken terrain. Elevation on this site varies from 6,800 to 7,000 feet.

Map 3. Hanna South is located about one-half mile south of Hanna, Carbon County, Wyoming, covering an area of 4,320 acres. Highway 287 bisects the lease into two geographic areas. Lease portions north of Highway 287 are characterized by fairly level terrain with intermittent streams and wet meadows. Vegetation is in the form of grass and sagebrush with occasional patches of greasewood. South of Highway 287 the relief is greater and vegetation consists of dense stands of big sagebrush. Standpipe Draw, the primary drainage, traverses the lease from south to north.

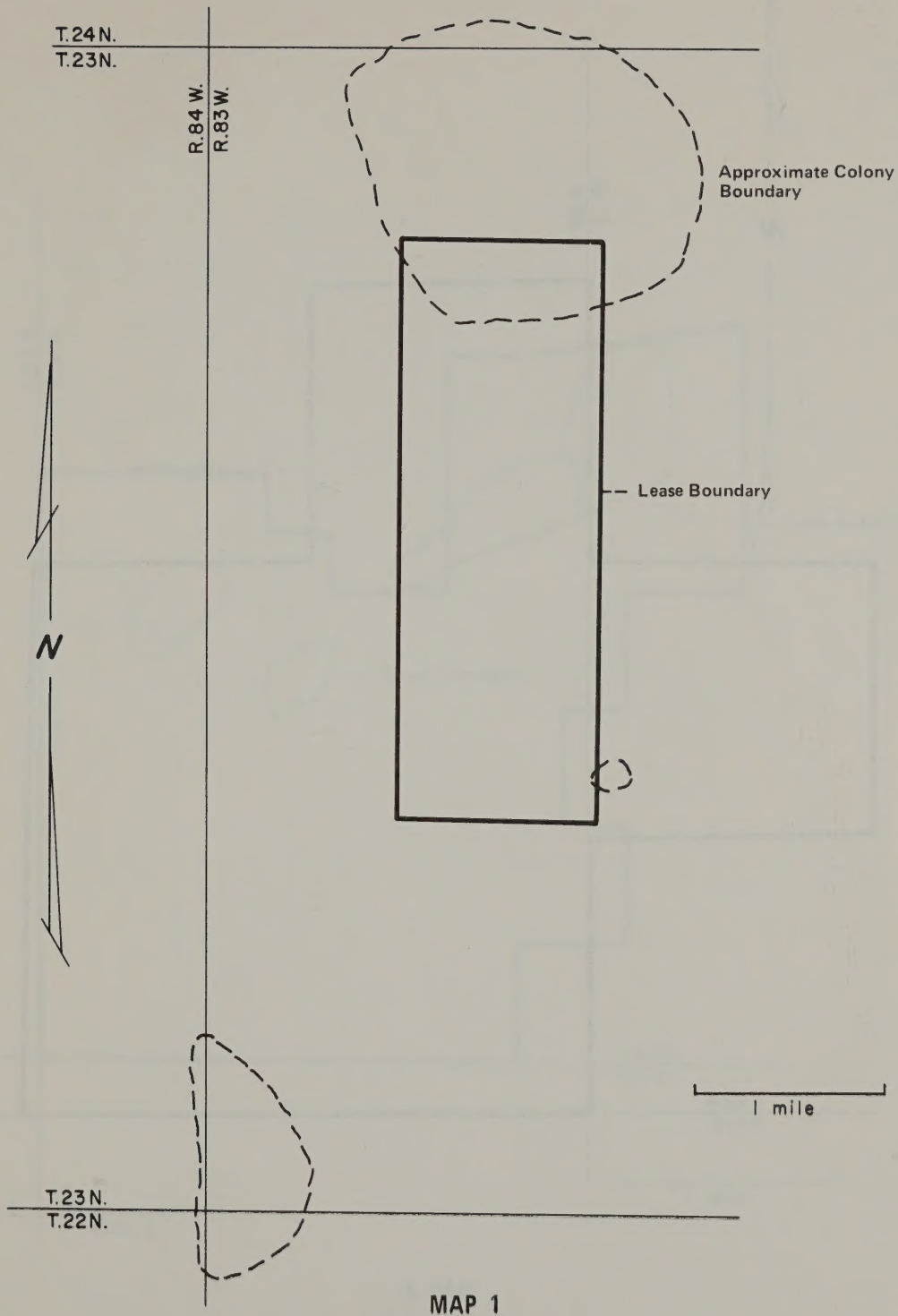
Map 4. Carbon Basin is located on County Road 402 approximately 10 miles south and 5 miles north of Medicine Bow, Carbon County, Wyoming. A relatively large lease, 14,400 acres, it ranges in elevation from 7,000 to 7,520 feet and is characterized by lowland areas near intermittent streams and highlands with swales and ridgetops. Vegetation is primarily sagebrush with some grassland and greasewood areas. Two intermittent streams, Second and Third Sand Creeks, traverse the central and southern portions.

Map 5. Red Rim is located in western Carbon and southwestern Sweetwater Counties three miles south of I-70 and approximately 25 miles southwest of Rawlins, Wyoming. A large lease, it ranges in elevation from 6,700 to 7,500 feet covering 38,400 acres. The north portion is fairly flat with gentle rolling hills characterized by stands of big sagebrush and open areas of grass. Going south the elevation increases and terrain becomes more broken with increasingly denser stands of big sagebrush, having very few open grass areas. Separation Creek forms the major drainage running north and south.

Map 6. Black Butte, approximately 39,000 acres, was the largest lease surveyed. Located seven miles south of Point of Rocks, Sweetwater County, Wyoming, its elevation ranged from 6,566 to 7,300 feet, the greatest elevation variation of any lease. Terrain varied from bottom flats and rolling hills to ridges and bench tops. Vegetation consisted of big sagebrush, grasslands, kochia flats and

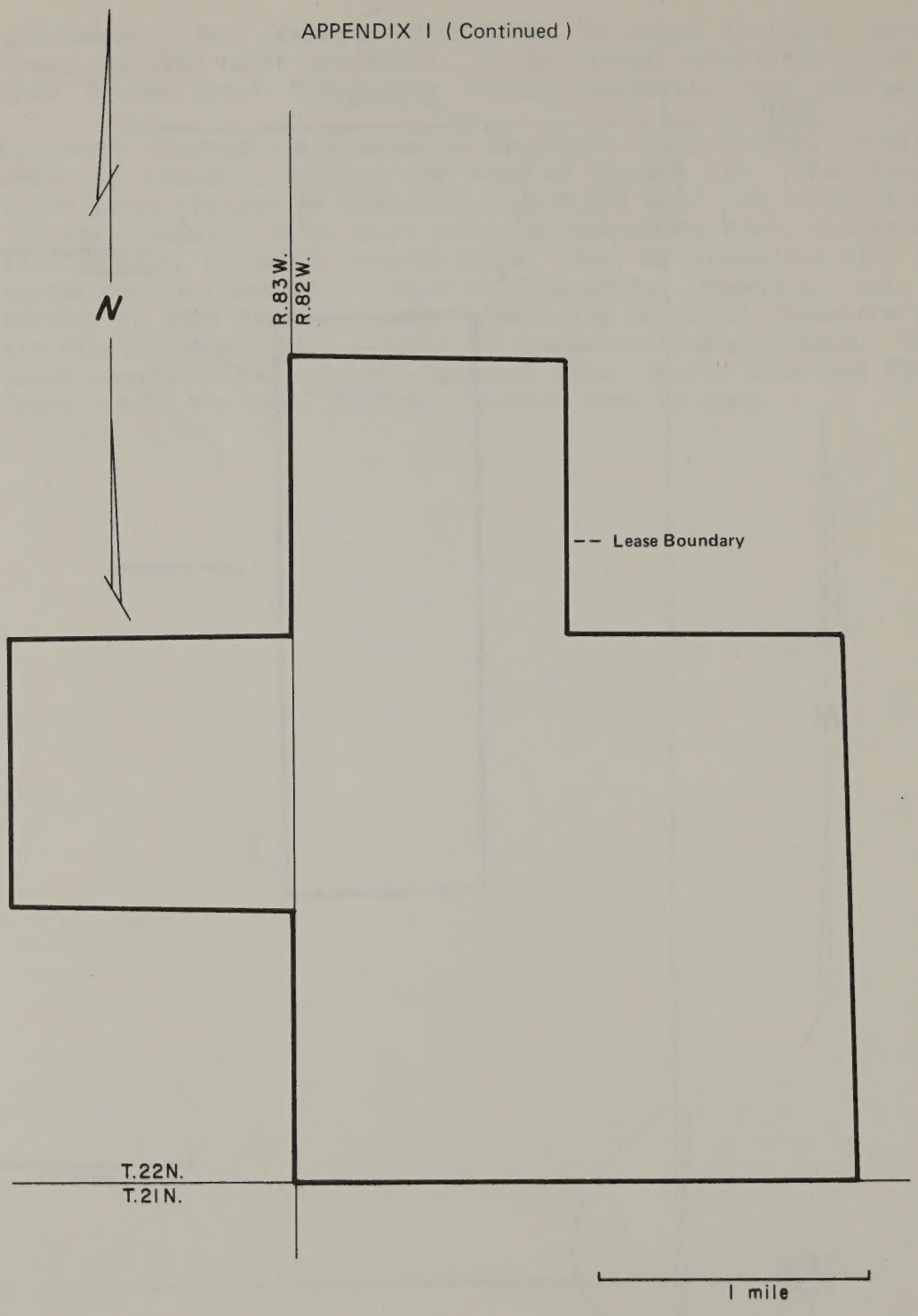
greasewood. The lease is divided by on major drainage, Bitter Creek, running north and south. It is further subdivided by 10 or more Bitter Creek tributaries running primarily east and west.

Map 7. South Haystack is located in northwest Uinta County, 27 miles south of Kemmerer, Wyoming and west of Highway 189. This lease, 8,320 acres, ranges in elevation from 6,680 to 7,340 feet. Along the east boundary is an area known as Cumberland Flat, characterized by level to gentle rolling hills. West of Cumberland Flat the elevations increase with larger rolling hills. Vegetation here is similar to that found on other leases, big sagebrush dominates the terrain intermixed with patches of greasewood and grassland. Four major creeks, Albert Creek, Haystack Draw, Meadow Draw and Clear Creek, drain the area, flowing primarily west to east.



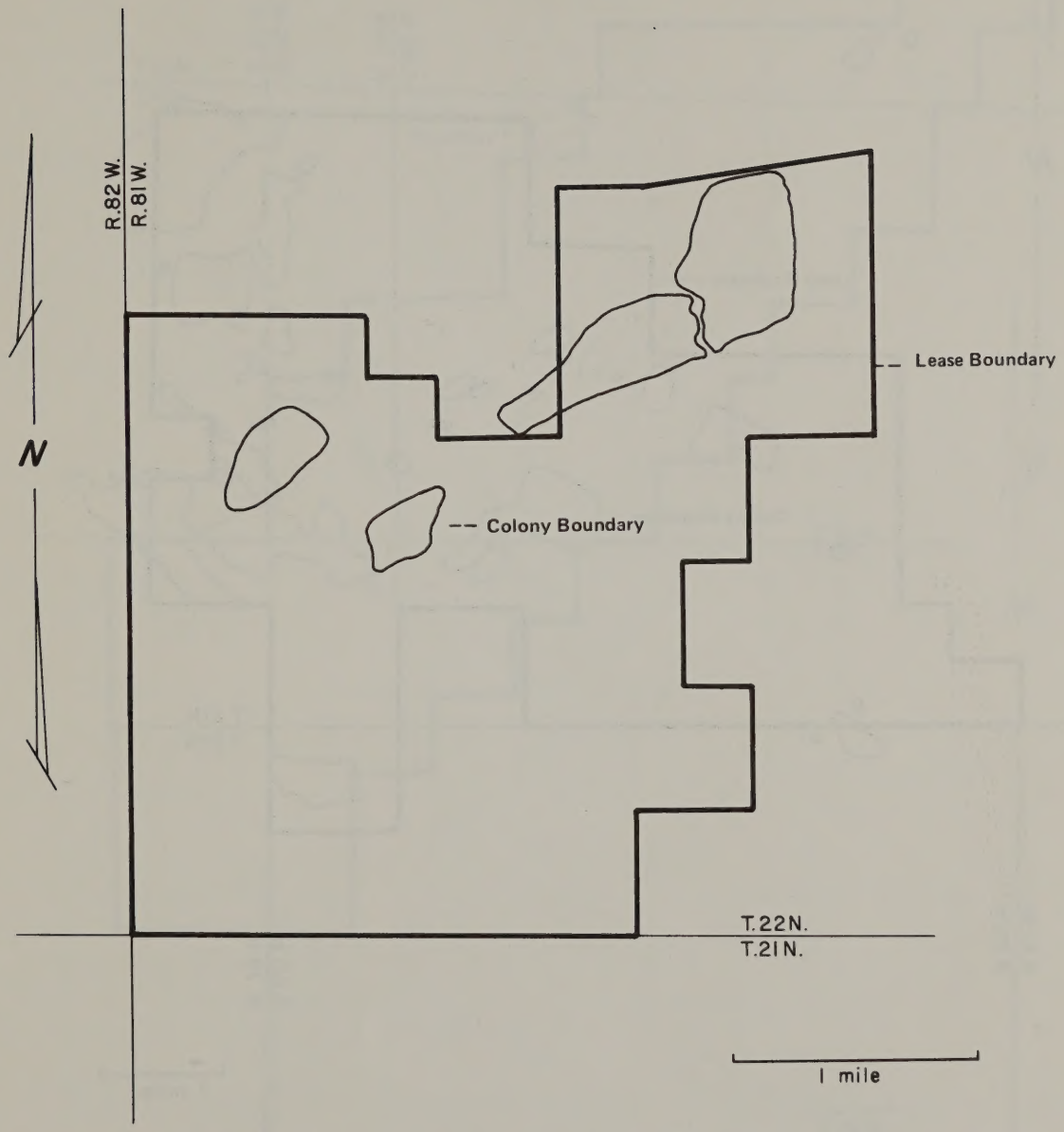
MAP 1
MEDICINE BOW BYPASS *

* Three white–tailed prairie dog colonies, mapped by BLM, were surveyed

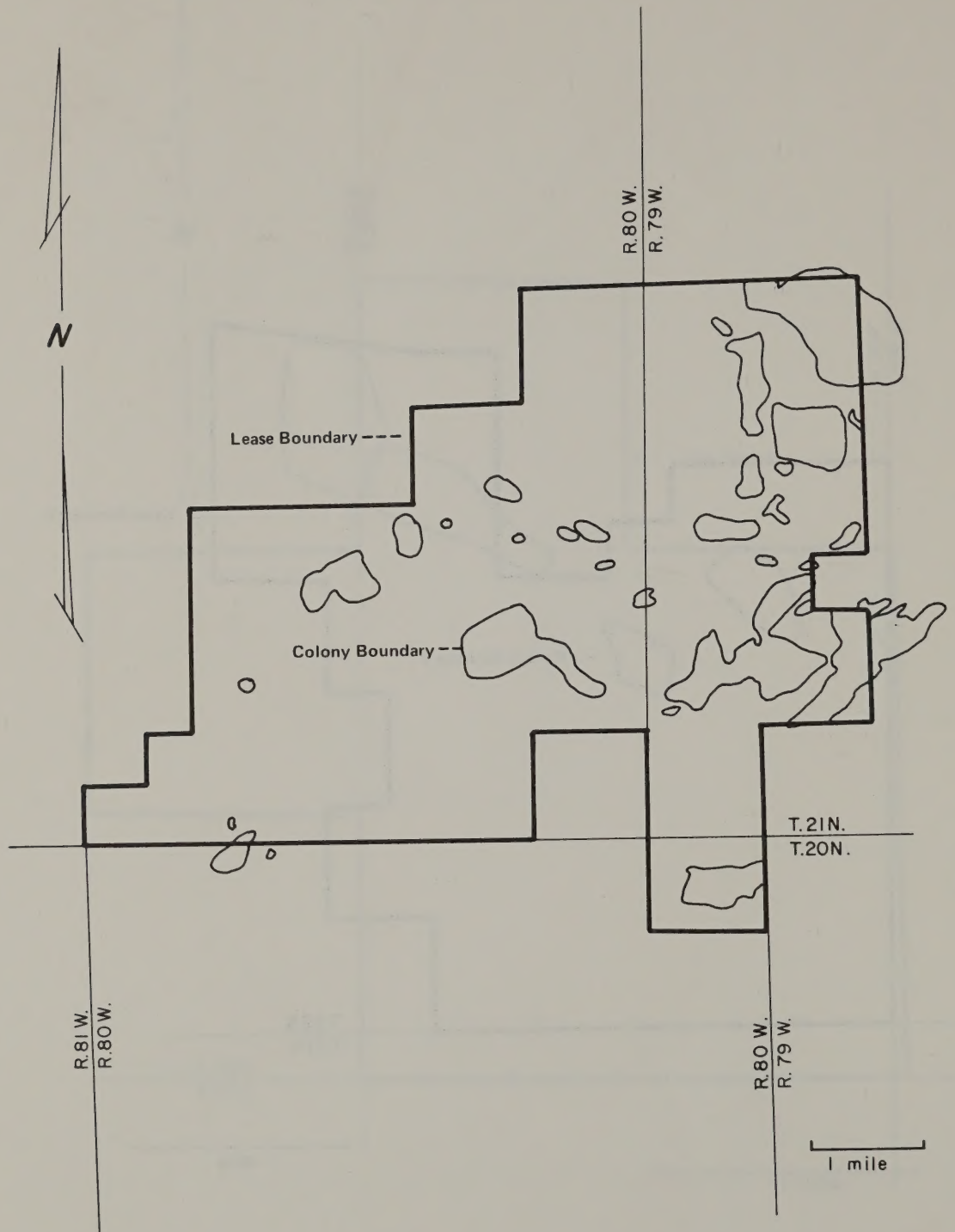


MAP 2
SEMINOE 1 *

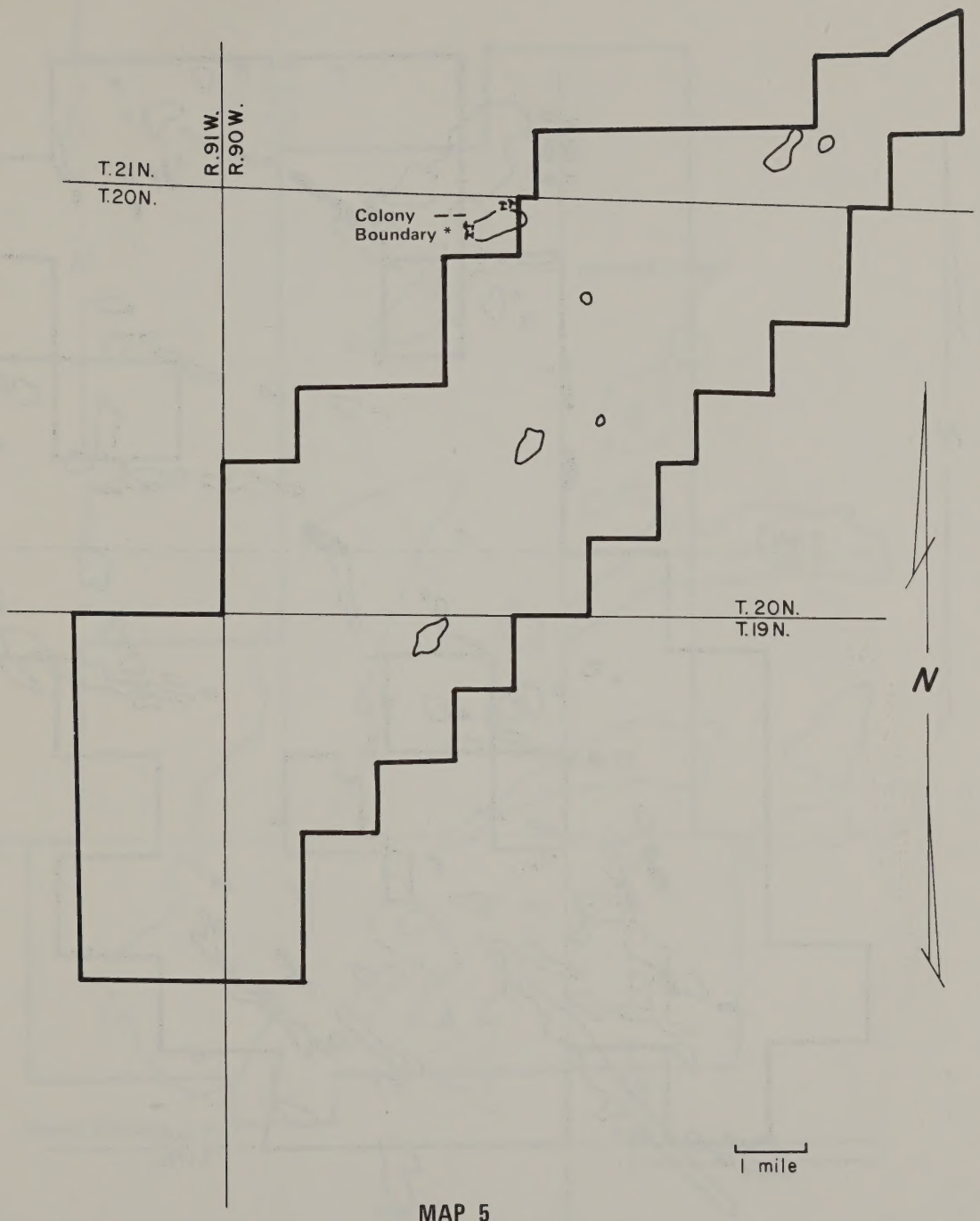
* No white—tailed prairie dog colonies were found on Seminoe 1



MAP 3
HANNA SOUTH

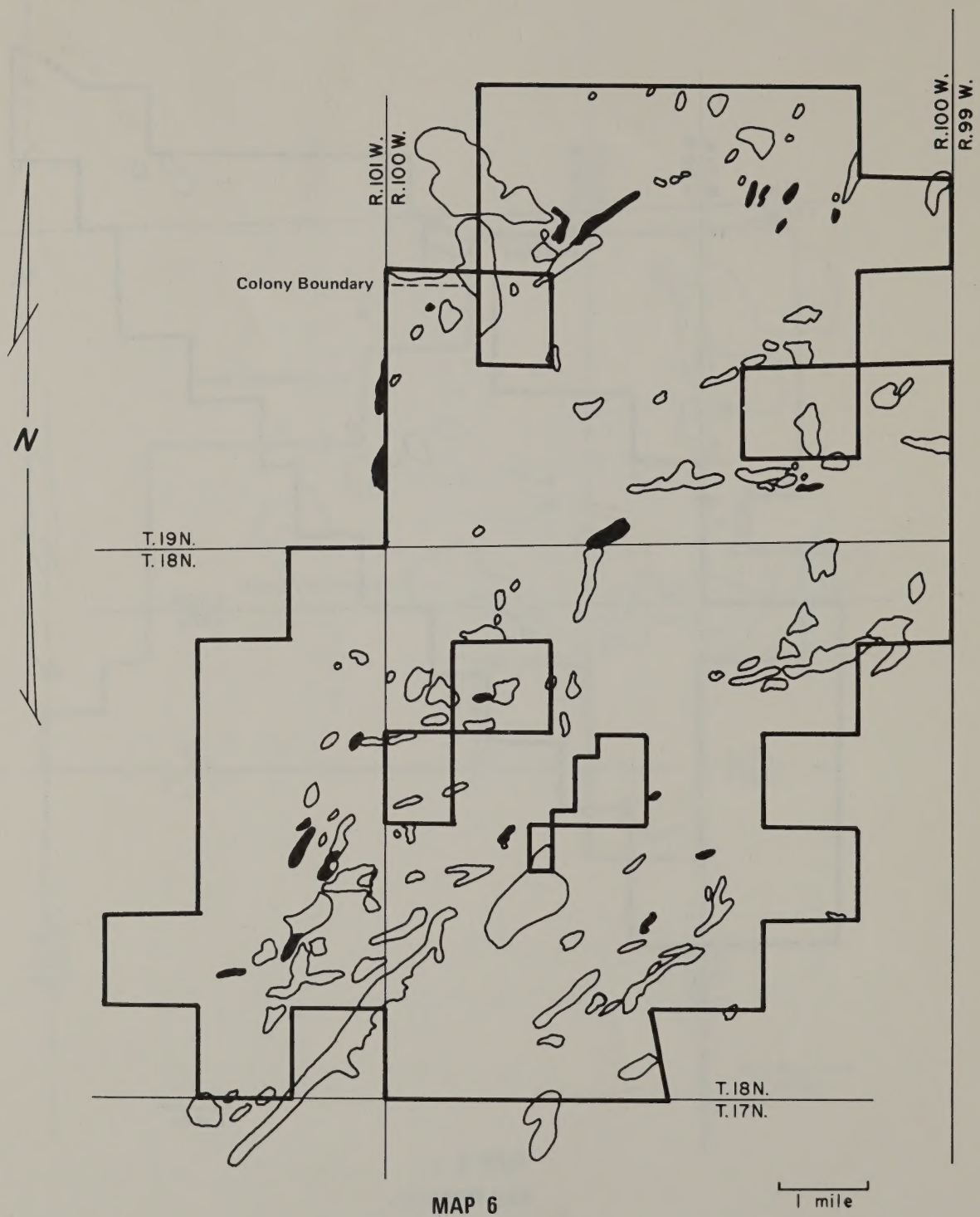


MAP 4
CARBON BASIN



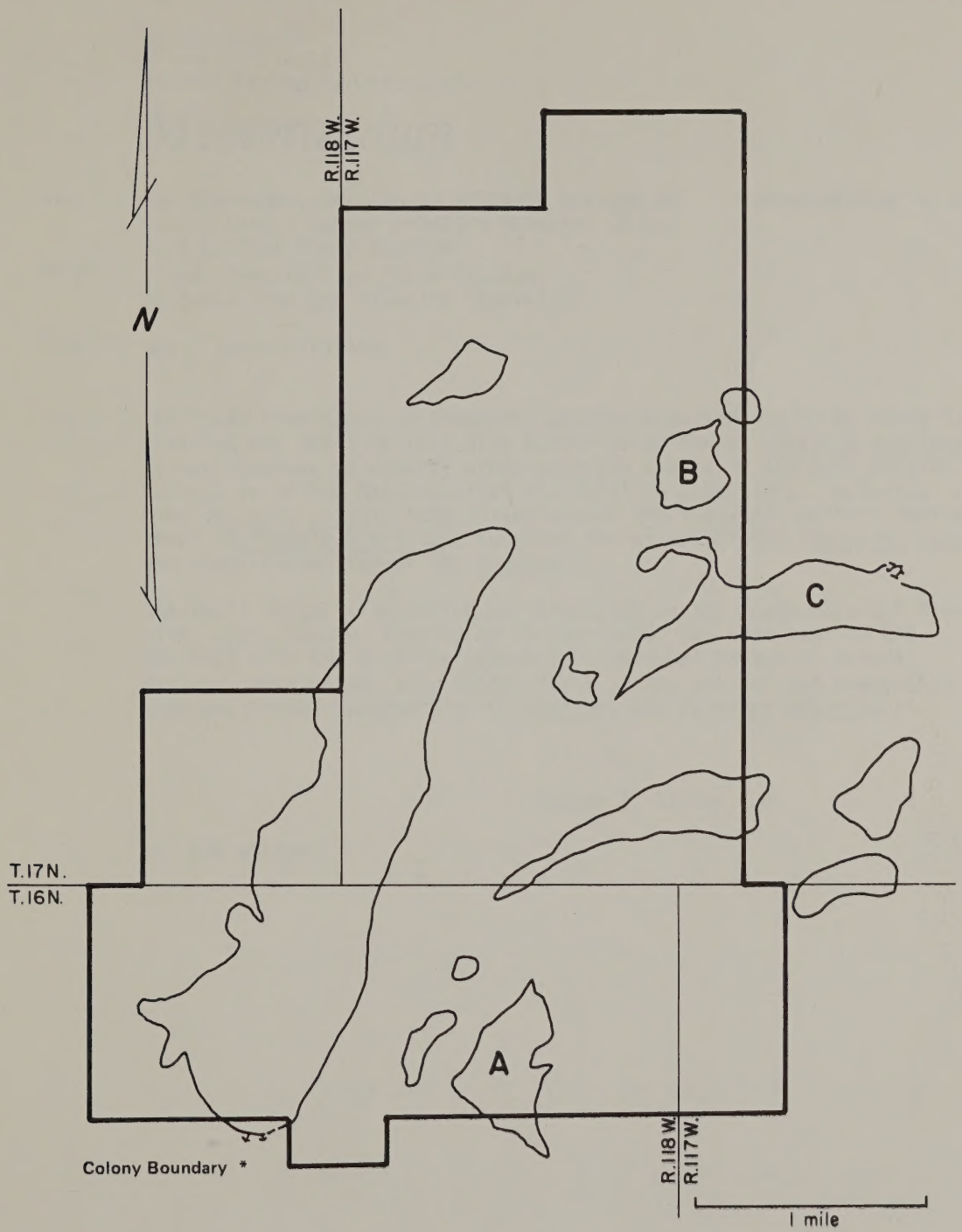
MAP 5
RED RIM

* White–tailed prairie dog colony extended beyond area surveyed



MAP 6
BLACK BUTTE *

* Shaded areas represent areas misinterpreted and mapped as colonies .



MAP 7
SOUTH HAYSTACK

* Colony boundary extended onto private land holdings

APPENDIX II

OPTIONAL FORM NO. 10
JULY 1973 EDITION
GSA FPMR (41 CFR) 101-11.6

UNITED STATES GOVERNMENT

Memorandum

TO : Max Schroeder, Section of Wildlife Ecology on Public Lands, Denver Wildlife Research Center Fort Collins Field Station

DATE: October 4, 1978

FROM : Chief, Fort Collins Field Station, National Fish and Wildlife Laboratory

SUBJECT: Skull identification

The skull from south of Kemmerer, Wyoming submitted to me by Steve Martin (catalog no. 4059) is that of a black-footed ferret (Mustela nigripes). It was compared to several other mustelid skulls in the Fort Collins Collection of the National Fish and Wildlife Laboratory, including mink (Mustela vison), long-tailed weasel (M. frenata), western spotted skunk (Spilogale gracilis), European ferret or polecat (Putorius putorius) and black-footed ferret (M. nigripes).

The skull in question, which was picked up on the South Haystack Mine site, Uinta County, Wyoming on 15 Aug. 1978, has been sent to the National Fish and Wildlife Laboratory, National Museum of Natural History, Washington, D.C. 20560, for a second opinion and comparison with additional specimens of M. nigripes and Putorius putorius.

Robert B. Finley, Jr.

cc: Don Wilson

5010-110

Buy U.S. Savings Bonds Regularly on the Payroll Savings Plan

OPTIONAL FORM NO. 10
JULY 1973 EDITION
GSA FPMR (41 CFR) 101-11.6

UNITED STATES GOVERNMENT

Memorandum

TO : Max Schroeder, Denver Wildlife Research Center
Field Station, Fort Collins, Colorado

DATE: October 19, 1978

FROM : Don E. Wilson, Chief, Museum Section
National Fish and Wildlife Laboratory

SUBJECT: Confirmation of Identification

The skull from south of Kemmerer, Wyoming, sent to the National Museum by Robert Finley (Catalog No. 4059) is a Black-footed ferret (Mustela nigripes). We have compared the specimen to a wide variety of other skulls in the National Museum by myself and Robert D. Fisher, Project Leader for Curatorial Services.

Don E. Wilson

5010-110

Buy U.S. Savings Bonds Regularly on the Payroll Savings Plan

APPENDIX III

Black-footed Ferret Survey Procedures Used During 1978 Surveys on White-tailed Prairie Dog Colonies in Wyoming

1. Identify area proposed for survey.

2. Locate all prairie dog towns within the area using aerial photographs, ground searches, and colony maps provided by the Bureau of Land Management.

3. Plot all prairie dog towns on 7.5 minute series topographic maps obtained from the U.S. Geological Survey.

4. Divide colonies into workable marked segments in preparation for systematic searching.

5. Start morning surveys with 1-3 hours of spotlight searching on previously selected areas of high burrow density.

6. Prior to walking surveys, scan colonies for black-footed ferrets using binoculars and spotting scopes.

7. Conduct walking surveys on the entire colony examining every hole 2 inches or more in diameter while looking for black-footed ferrets or possible signs, i.e,:

   a. Trenches or stringers of soil 15-20 cm wide, 5-8 cm deep, and from .3-3.5 m long with a groove in the center.

   b. Prairie dog burrows plugged with soil.

   c. Skeletal material: (1) skulls of prairie dogs that have been chewed or show small tooth marks near the base, (2) skulls of black-footed ferret (Fig. 5).

   d. Fecal droppings from mustelid type animals. Usually marked by segmentation and twisting when composed of hair, varying from dark brown to black in color, approximately 6 mm in diameter and 25-100 mm long (Fig. 6).

   e. Prairie dog behavior: upright posture and alarm chatter in response to predators.

8. In areas where a possible ferret sign is found, three to six replicated night surveys are recommended using the following procedures:

   a. Locate and mark area to be spotlighted during the daytime survey and locate access roads to area.

   b. Drive to the search area after dark or before sunrise, park vehicle, and wait 5 minutes before starting searches with spotlight. Using a 100,000 candle-power spotlight (hand held or vehicle mounted), sweep the light slowly back and forth across the colony looking for green eye shine. Use the spotlight for a minimum of 1

hour per stop in intervals of 5 minutes on and 5 minutes off. Conduct spotlighting 1-3 hours prior to sunrise and from 1-3 hours after sundown.

c. When green eye shine is observed, attempt to identify the animal. If identification is not possible, mark the location with flagging for future day and night surveys.

ACKNOWLEDGMENTS

The authors wish to express their gratitude to the many individuals who helped make these surveys a success. Thanks are extended to personnel of the Wyoming Game and Fish Department, Bureau of Land Management, U.S. Fish and Wildlife Service Endangered Species Office Region 6, and private consultants for their efforts in outlining the problem and helping with the strategies needed to conduct these searches. Our thanks go to Mr. Merlin Hehnke who coordinated the preparation of the Memorandum of Understanding; to Vincent H. Reid and Charles P. Stone for their critical review of this manuscript; to Erwin Boeker for his efforts in administration of the program, and to Conrad Hillman for helping to train personnel, and for organization and consulting efforts. Tim Clark is acknowledged for his consultation and encouragement for this survey. A special thanks also goes to the many personnel of the BLM who made this survey possible. State Director Dan Baker and his staff recognized the need for this work and made this cooperative interagency effort possible. District personnel, including Larry Kmoch, made space for housing team members at the BLM administered compound in Rawlins available. Thanks also go to our colleague, Robert Tigner, who provided personnel and horses for survey use, travel trailers used during the survey, and aided in clearing details with the City for housing team members in Rawlins. Mary Ann Greiveldinger provided clerical assistance to crew members and accepted the preparation of overtime and travel documents for six persons in addition to her already heavy workload. We would especially like to give our thanks to Carol Ross for the art work and to Bill Peterson for the graphics; both are with the BLM's Wyoming State Office. To the many we've missed acknowledging, our thanks. Without all of you these surveys would have been much more difficult to accomplish.

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